Systems engineering

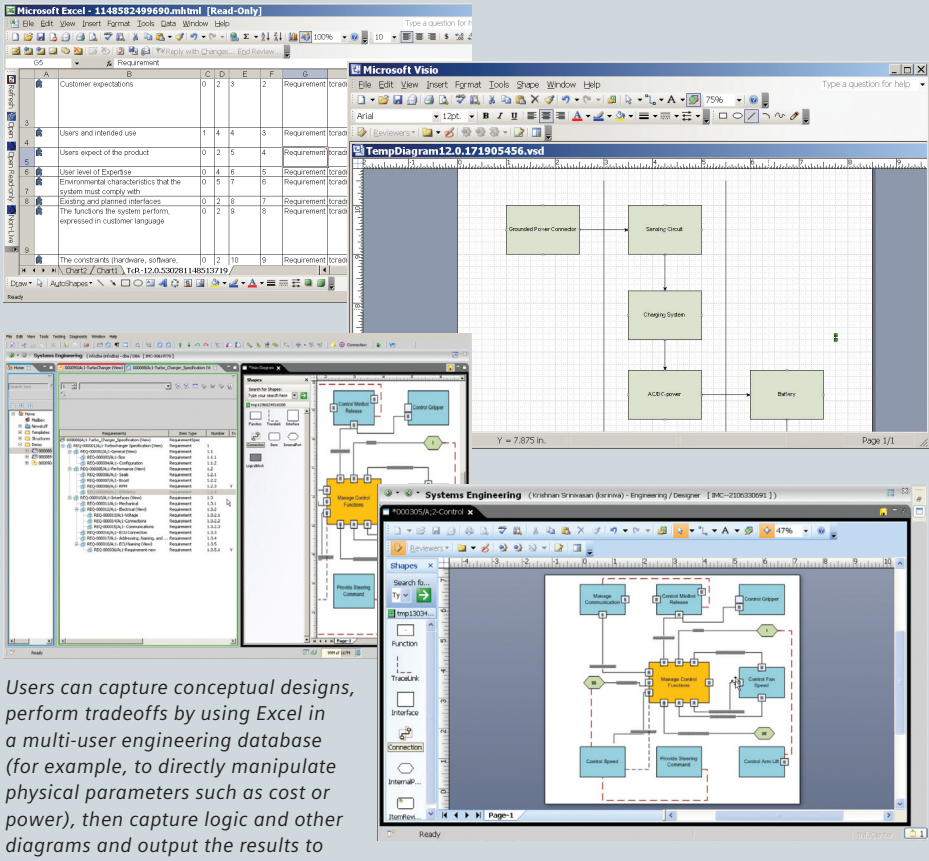
A whole system approach to improving product development

Benefits

- *Achieve right-to-market* – by ensuring that your products meet customer value perceptions, time-to-market windows of opportunities and quality-related objectives
- *Accelerate time-to-market* – by enabling your development teams to understand the entire impact of their design decisions as early in the product lifecycle as possible, thereby minimizing unnecessary rework
- *Meet customer expectations* – by making certain that every aspect of your product complies with its related customer and regulatory requirements
- *Ensure compliance* – by enabling program managers to measure and track design items that must comply with specific requirements and flagging instances when a requirement is in danger of being violated

Summary

Teamcenter® software's solution for systems engineering provides a first-of-its-kind environment that companies can use to apply systems engineering concepts to product development. An integrated systems engineering solution, Teamcenter links requirements management and model-driven systems design with the rest of your company's product and process knowledge enabling you to understand your products and systems in their entirety and optimize the trade-offs that must be made throughout a decision-intensive product lifecycle.



Users can capture conceptual designs, perform tradeoffs by using Excel in a multi-user engineering database (for example, to directly manipulate physical parameters such as cost or power), then capture logic and other diagrams and output the results to standard documents by using Visio.

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Systems engineering

Benefits *continued*

- *Master product change* – by enabling development teams to see the impact that design changes and product decisions will have across all views of a system – as well as enabling managers to monitor product development as it takes place
- *Optimize the whole product* – by using high-level product abstractions to interrelate and optimize complex, interdependent product constraints and subject them to tradeoff analysis before detailed design begins

Features

- *An intuitive user interface*, which looks and acts like Windows file Explorer and Outlook, enables developers to graphically represent complex products and their related systems
- The ability to *reach all* objects in Teamcenter via unique web addresses allows you to manipulate and access those objects by simply clicking on a URL hyperlink
- *"Live" Microsoft Office integrations* allow users to interact with requirements information directly from their desktop, thereby effectively integrating isolated desktops with an enterprise product repository
- Teamcenter enables you to *capture product decompositions* from a variety of perspectives – such as functions, safety and maintenance – and interrelate these views for cross-view optimization

Define system/subsystem views

Companies that provide discretely manufactured products can use the Teamcenter library of graphical building blocks to create multiple high-level system views called hierarchies. You can create hierarchies to represent various product views, including product structures, organizational assignments, cost analyses, manufacturing views, project management perspectives and documentation views. Once captured, these views can be interrelated, giving you whole product visibility for cross-product/cross-view optimization.

For example, automotive companies can create graphical hierarchies to represent product structures for cars, trucks and other kinds of vehicles that are comprised of many assemblies, parts and components. The product structure connects the vehicle's parts to each other and links customer requirements and program constraints to each part and assembly. Other views, such as safety, reliability, supplier, materials, function and manufacturing views, can also be connected to one an-other, as well as to the product structure – thereby allowing you to see how a requirements change ripples across all views.

Besides being able to capture these views, developers are able to "hook up" these views logically. For example, a functional hierarchy can represent the functional elements for a functional block diagram. To construct these diagrams Teamcenter supports Microsoft Visio, one of the industry's most popular diagramming tools and one that your users are already familiar with.

Live integration with Microsoft Visio

Teamcenter uses Visio, the same diagramming tool that many of your users already employ. In Teamcenter, Visio acts as the user interface that elevates your diagrams to a multi-user systems architecting database. A variety of diagramming notations are supported using standard Visio stencils, including functional block diagrams, system block diagrams, UML diagrams, IDEF diagrams, network diagrams and flowcharts (to name a few examples). In addition, users can create and extend their own stencils using standard Visio stencil mapping via XML.

System design and optimization

The Teamcenter solution for systems engineering provides an interdisciplinary environment that you can use to fully understand your products, improve crucial processes in your product development cycle and drive your company's systems engineering initiatives. By facilitating whole-product understanding, Teamcenter enables you to optimize the tradeoffs associated with various take-to-market decisions. Teamcenter delivers a variety of web-based groupware collaboration and information-linking capabilities to facilitate these strategic objectives.

- A stencil library of graphical building blocks enable development teams to quickly describe complex products from a systems-oriented perspective – as well as to break down these high-level product hierarchies into fine-grain design elements, program constraints and project notes. Linked design elements enable developers to align design content with customer requirements. Program constraints enable development teams to manage the product's cost, performance and other related variables. Project notes enable developers to explain their design intent, record their concerns and raise appropriate issues of interest
- Seamlessly integrated with requirements management, your enterprise can capture requirements documents from multiple sources, parse these documents for individual requirements and retain those requirements in the same environment you use for product lifecycle management (PLM). In turn, this integration enables you to incorporate these requirements into the workflow-driven processes you use to drive your engineering, sourcing, manufacturing planning, total quality and change-related decisions
- Teamcenter's document-generation capabilities allow you to capture, manage and re-use documents as a living by-product of your development process

Features *continued*

- You can capture inputs, outputs and logic of each view using *standard diagramming tools* to effectively integrate various diagrams (for example, logic, functional, control and UML diagrams) with your requirements and enterprise product repository, as well as to ensure that your diagrams always reflect your current design state
- An *automatic tracing* mechanism links the summary requirement in the retained database to the specific paragraph in the source document from which it was extracted
- A *natural-language* report writer enables users to query the database and respond with tabular, document or diagrammatic results in user-defined formats
- A *robust document* generator enables users to create finished form documents
- All system engineering and requirements elements participate in schedule, resource, configuration, workflow and change processes
- *Security* protections control user access, information access and modification privileges, as well as enabling you to monitor change histories and perform baseline comparisons

Document decision support knowledge

Development teams can attach notes to any object to document their design decisions, explain their rationale, express supplier concerns and/or record other issues of interest. In addition, notes can be used in exported documents and "live" interfaces.

To further assist system architects in decision support processes all the elements created during the requirements and system definition processes are treated as objects in the Teamcenter database. As Teamcenter objects relationships and dependencies between them can be created. In addition, they can participate in schedule and resource planning, configuration and variant management, as well as structured workflows and change processes.

This integrated approach to systems engineering and requirements management enables you to more effectively monitor project status, support design decisions, assess the impact of a change, verify performance and validate compliance to customer or contract requirements.

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